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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/622,607	07/18/2003	Xiaochun Linda Chen	QIM 2003 P 50508 US	4285
68/038 7590 10/15/2008 SLATER & MATSIL, L.L.P. 17950 PRESTON ROAD SUITE 1000 DALLAS, TX 75252				
EXAMINER				
SUCH, MATTHEW W				
ART UNIT		PAPER NUMBER		
2891				
MAIL DATE		DELIVERY MODE		
10/15/2008		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/622,607

Applicant(s)

CHEN ET AL.

Examiner

Matthew W. Such

Art Unit

2891

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 June 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11, 14, 26-28, 30-35 and 37-42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7-11, 14, 35 and 37 is/are allowed.
- 6) ☒ Claim(s) 1, 5, 26-28, 30-33 and 39-42 is/are rejected.
- 7) ☒ Claim(s) 2-4, 6, 34 and 38 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 June 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Final Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Objections

1. Claims 34 and 38 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. The claims recite "wherein the ring of resist protects devices formed in the inner region of said substrate from shining spots present in said periphery of said substrate." However, this statement is merely a recitation of an intended use of the ring of resist. The examiner notes that intended use/outcome/result of a specific step in a method claim does not narrow scope of the method claim past the specific recited step. See MPEP § 2106 II C and MPEP § 2111.04. However, since the claims do not actually recite any steps, the claims do not further limit the previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1 and 42 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant

art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The claims recite "wherein no semiconductor devices are formed in the periphery region" which is not disclosed in the Applicant's originally filed disclosure. The specification fails to describe that the periphery does not have any semiconductor devices. While the specification does not positively recite that there are semiconductor devices in the periphery, the mere absence of a positive recitation is not basis for exclusion. See MPEP § 2173.05(i). The specification is totally silent on this matter and does not state anywhere that the periphery is devoid of semiconductor devices.

4. Claim 5 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The claim recites "further comprising forming a further resist layer prior to forming the ring". However, claim 1 already recites "a ring of organic material" and "a resist layer", which are the two layers described by the specification. The "further resist layer" of claim 5 is a third layer, which has not been disclosed by in the originally filed specification.

5. Claims 26 and 39 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed

invention. Claim 26 recites "wherein the material is not disposed on a bottom surface of the wafer" and claim 39 recites "wherein the organic material is not present on a bottom surface of the wafer" which are not disclosed in the originally filed disclosure. The specification fails to describe that a bottom surface does not have the [organic] material. While the specification does not positively recite that there is any [organic] material on a bottom surface, the mere absence of a positive recitation is not basis for an exclusion of claimed subject matter. See MPEP § 2173.05(i).

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claim 26 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The phrase "without a lithographic step" renders the claim indefinite because the claim does not define what is considered "a lithographic step". Any method by which any arbitrary pattern is formed, is "lithography", meaning that in order for the layer to even exist, it had undergone some form of lithography. See, for example, Merriam Webster's Collegiate Dictionary, 10th Edition, which describes lithography as "the process of producing patterns on semiconductor crystals for use as integrated circuits." Therefore, since anything can be considered "a lithographic step" it is impossible to have a pattern without also having "a lithographic step" because "without a lithographic step" would mean the absence of everything and also would mean the non-existence of the layer. Furthermore, the phrase "a bottom surface

of the wafer" renders the claim indefinite because it is unclear what comprises "a bottom surface of the wafer" particularly in relationship to "a top surface" of the wafer. For example, the wafer can be held in such a fashion with the normal direction of the resist covered surface running parallel to the surface of the Earth making that surface both a "top surface" (portion closer to the sky) and a "bottom surface" (portion closer to the ground).

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. In so far as definite, claims 26, 28, 30 and 32-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Holscher ('076).

10. Regarding claims 26, 30 and 32, Holscher teaches a method of forming providing a silicon wafer (Element 12; Col. 3, Lines 7-19) that includes a top surface (see "front" Element 14 side) that includes a periphery region on the top surface of the wafer (area of top covered by Element 14) that surrounds an inner device region (between Element 14) on the top surface of the wafer. A ring of resist material (Element 20 patterned) is formed directly onto (since the resist contacts the substrate) the top surface of the wafer to separate the periphery region from the device region (as discussed above the "periphery" and "device region" are defined). A

plurality of devices (i.e. exposed regions of substrate or Element 13), are formed in the device region at the top surface of the wafer. There are "no devices" formed in the periphery since it is covered by a protective pad layer during device fabrication. The Examiner notes that no shape can be formed on a substrate "without lithography". The Examiner also notes that the resist layer is not on a "bottom" surface (surface of Holscher opposite the "top surface") of the wafer.

11. Regarding claim 28, Holscher further teaches that the forming step comprises depositing material in a region between the periphery of the wafer and a region between the periphery and the inner device region. Since the claim does not define characteristics which distinguishes "the periphery" from "a region between the periphery and the inner device region", any arbitrary area can be interpreted as such since inner device region is defined (Element 14).

12. Regarding claim 33, Holscher teaches that the plurality of devices formed in the front inner device region of the wafer are formed by lithography (Figures 5 and 9, for example). Holscher teaches that a resist (Element 20) is deposited over the area for lithography to be formed, covering the inner device region and ring of material (Fig. 4, for example). The resist is patterned by deep trench lithographic etching (Figure 5) and the wafer is "altered" in alignment with the patterned layer of resist.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2891

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. In so far as definite, claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Holscher ('076) in view of Nakayama ('315).

Holscher does not teach using a hard mask over the wafer and hence the ring of resist formed over a hard mask.

Nakayama teaches a method of forming resist over a hardmask over a wafer (Col. 11, Lines 4-12, for example). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a hardmask over the wafer and under the ring of resist, as is conventional. One would have been motivated to do so in order to passivate the silicon wafer, use the hard mask as a pattern formation for etching the wafer, and prevent defects in the wafer (Nakayama Col. 11, Lines 4-12, for example).

15. Claims 40-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holscher ('076) in view of Quirk (*Semiconductor Manufacturing Technology*).

Holscher teaches a method of forming providing a silicon wafer (Element 12; Col. 3, Lines 7-19) that includes a top surface (see "front" Element 14 side) that includes a periphery region on the top surface of the wafer (area of top covered by Element 14) that surrounds an inner device region (between Element 14) on the top surface of the wafer. A ring of resist material (Element 20 patterned) is formed over the top surface of the wafer to separate the periphery region from the device region (as discussed above the "periphery" and "device region")

are defined). The resist is "concentric" because it is around the edges of the wafer (see Element 20, for example), which is just as "concentric" as the Applicant's ring of resist (comparing Applicant's Figures to the Figures of Holscher). A plurality of devices (i.e. exposed regions of substrate or Element 13), are formed in the device region at the top surface of the wafer. There are "no devices" formed in the periphery since it is covered by a protective pad layer during device fabrication. A further layer of resist (Element 40) is provided on the ring of resist which is not patterned because its shape is the same as it was deposited (see Col. 4, Lines 35-50).

Holscher does not teach that the ring of resist is positive resist. However, Quirk teaches that positive resist is a conventional functional equivalent to negative resist, which Quirk also teaches is the only other kind of resist (see Page 304). Furthermore, positive resist has the advantage that it is the conventionally used and dominant type of resist in modern manufacturing techniques, particularly for submicron applications. Therefore, given the advantage that positive resist is the dominate resist used in semiconductor manufacturing, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a positive resist as the resist of Holscher.

Allowable Subject Matter

16. Claims 2-4 and 6 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims without changing the scope of the subject matter.

17. Claims 7-11, 14 and 34-38 are allowed.

18. The following is an examiner's statement of reasons for allowance:

- a. Regarding claim 34, a search of the prior art does not disclose or reasonably suggest a method disclosing the combination of limitations claimed. Specifically, the oxide/nitride/hardmask configuration with a patterned resist layer forming a ring of resist and depositing a further layer of resist atop the ring of resist; further including patterning the further layer of resist, etching the hardmask with the patterned resist layers, removing the further layer of resist, and etching a trench with the ring of resist remaining after the trench is etched.
- b. Regarding claim 7, a search of the prior art does not disclose or reasonably suggest a method disclosing the combination of limitations claimed. Specifically, forming a positive resist on a substrate and patterning the positive resist to form a ring, then after removing the patterned resist another resist layer is formed on the substrate and on the positive resist remaining and exposing the other resist within the ring to form a patterned region, leaving the other resist on the ring of positive resist unpatterned.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

19. Since claim 7 is allowable, the restriction requirement between species I and II, as set forth in the Office action mailed on 22 May 2006, has been reconsidered in view of the allowability of claims to the elected invention pursuant to MPEP § 821.04(a). **The restriction requirement is hereby withdrawn as to any claim that requires all the limitations of an allowable claim.** Claims 9 and 10, directed to the withdrawn species, are no longer withdrawn from consideration because the claim(s) requires all the limitations of the allowable claim 7.

In view of the above noted withdrawal of the restriction requirement, applicant is advised that if any claim presented in a continuation or divisional application is anticipated by, or includes all the limitations of, a claim that is allowable in the present application, such claim may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application.

Once a restriction requirement is withdrawn, the provisions of 35 U.S.C. 121 are no longer applicable. See *In re Ziegler*, 443 F.2d 1211, 1215, 170 USPQ 129, 131-32 (CCPA 1971). See also MPEP § 804.01.

Response to Arguments

20. Applicant's arguments filed 16 June 2008 regarding the rejection of claims 26 are have been fully considered but they are not persuasive. The Applicant argues that the specification supports that limitation of "wherein the ring is deposited directly onto the periphery region without a lithographic step" (see Page 11 of Remarks) because the specification recites "without a lithographic step". However, this language is does not define what a lithographic step is. Any method by which any arbitrary pattern is formed, is "lithography", meaning that in order for the

layer to even exist, it had undergone some form of lithography. See, for example, Merriam Webster's Collegiate Dictionary, 10th Edition, which describes lithography as "the process of producing patterns on semiconductor crystals for use as integrated circuits." Therefore, since anything can be considered "a lithographic step" it is impossible to have a pattern without also having "a lithographic step" because "without a lithographic step" would mean the absence of everything and also would mean the non-existence of the layer. The public, therefore, would not know exactly what is meant by the phrase of "without a lithographic step" since a pattern in the resist has been formed. Furthermore, the phrase "a bottom surface of the wafer" renders the claim indefinite because it is unclear what comprises "a bottom surface of the wafer" particularly in relationship to "a top surface" of the wafer. For example, the wafer can be held in such a fashion with the normal direction of the resist covered surface running parallel to the surface of the Earth making that surface both a "top surface" (portion closer to the sky) and a "bottom surface" (portion closer to the ground).

21. Applicant's arguments with respect to claims 1 and 40-42 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

22. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

23. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew W. Such whose telephone number is (571) 272-8895. The examiner can normally be reached on Monday - Friday 9AM-5PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Purvis can be reached on (571) 272-1236. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Matthew W. Such
Examiner, Art Unit 2891

MWS
10/9/08

/Douglas M Menz/
Primary Examiner, Art Unit 2891
10/10/08